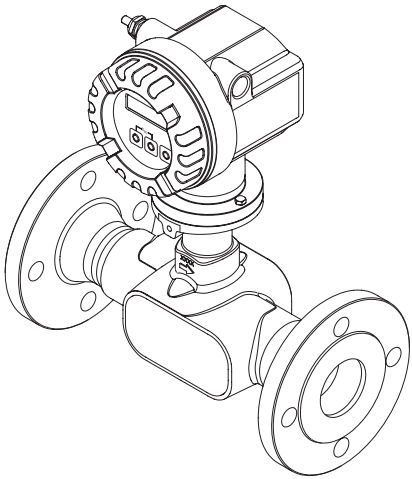
Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Brief Operating Instructions

Proline Prosonic Flow 92F

Ultrasonic flow measuring system
Two-wire inline flowmeter



These Brief Operating Instructions are not intended to replace the Operating Instructions provided in the scope of supply.
Detailed information is provided in the Operating Instructions and the additional documentation on the CD-ROM supplied.

The complete device documentation consists of:
- These Brief Operating Instructions
- Depending on the device version:
  - Operating Instructions and the Description of Device Functions
  - Approvals and safety certificates
  - Special safety instructions in accordance with the approvals for the device (e.g. explosion protection, pressure equipment directive etc.)
  - Additional device-specific information

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People for Process Automation

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1 Safety instructions

1.1 Designated use

- The measuring device is to be used only for measuring the flow of liquids in closed pipes e.g.
  - Acids, alkalis, paints, oils
  - Liquefied gas
  - Ultrapure water with a low conductivity, water, wastewater
- In addition to measuring the volume flow, the measuring device also measures the sound velocity of the fluid. In this way, different fluids can be distinguished or the fluid quality can be monitored.
- Any use other than that described here compromises the safety of persons and the entire measuring system and is, therefore, not permitted.
- The manufacturer is not liable for damage caused by improper or non-designated use.

1.2 Installation, commissioning and operation

- The measuring device must only be installed, connected, commissioned and maintained by qualified and authorized specialists (e.g. electrical technicians) in full compliance with the instructions in these Brief Operating Instructions, the applicable norms, legal regulations and certificates (depending on the application).
- The specialists must have read and understood these Brief Operating Instructions and must follow the instructions they contain. If you are unclear on anything in these Brief Operating Instructions, you must read the Operating Instructions (on the CD-ROM). The Operating Instructions provide detailed information on the measuring device.
- The measuring device should only be installed in the pipe in a de-energized state free from outside loads or strain.
- The measuring device may only be modified if such work is expressly permitted in the Operating Instructions (on the CD-ROM).
- Repairs may only be performed if a genuine spare parts kit is available and this repair work is expressly permitted.
- If performing welding work on the piping, the welding unit may not be grounded by means of the measuring device.

1.3 Operational safety

- The measuring device is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. Relevant regulations and European standards have been observed.
- The manufacturer reserves the right to modify technical data without prior notice. Your Endress+Hauser distributor will supply you with current information and updates to these Operating Instructions.

- The information specified on the warning notices, nameplates and connection labels fitted on the measuring device must be observed. These contain important data, including information on the permitted operating conditions, the application of the measuring device and data on materials.
  If the measuring device is not operated at atmospheric temperatures, compliance with the relevant basic conditions specified in the device documentation provided (on the CD-ROM) is absolutely essential
- The measuring device must be wired in accordance with the wiring diagrams and connection labels. Interconnecting must be permitted.
- All parts of the measuring device must be integrated into the potential matching system of the plant.
- The cables, tested cable glands and tested dummy plugs must suit the prevailing operating conditions, e.g. the temperature range of the process. Housing openings that are not used need to be sealed with dummy plugs.
- The measuring device can only be used in conjunction with fluids to which all the wetted parts of the measuring device are adequately resistant. With regard to special fluids, including fluids used for cleaning, Endress+Hauser will be happy to assist in clarifying the corrosion-resistant properties of wetted materials.
  However, minor changes in temperature, concentration or in the degree of contamination in the process may result in variations in corrosion resistance.
  For this reason, Endress+Hauser does not accept any responsibility with regard to the corrosion resistance of wetted materials in a specific application. The user is responsible for the choice of suitable wetted materials in the process.
- When hot fluids are transported in the measuring tube, the surface temperature of the housing increases. In the case of the sensor, in particular, temperatures close to the fluid temperature can be expected. If the temperature of the fluid is high, take suitable measures to protect against scalding and burns.
- Hazardous areas:
  Measuring devices for use in hazardous areas are labeled accordingly on the nameplate. Relevant national regulations must be observed when operating the device in hazardous areas.
- Pressure devices:
  Measuring devices for use in systems that need to be monitored are labeled accordingly on the nameplate. Relevant national regulations must be observed when using these devices. The documentation on the CD-ROM for pressure devices in systems that need to be monitored is an integral part of the entire device documentation. The installation regulations, connection data and safety instructions provided in the Ex documentation must be observed.
- For measuring systems used in SIL 2 applications, the separate manual on functional safety (on the CD-ROM) must be observed.
- Endress+Hauser will be happy to assist in clarifying any questions on approvals, their application and implementation.

1.4 Safety conventions

⚠ Warning!
"Warning" indicates an action or procedure which, if not performed correctly, can result in injury or a safety hazard. Comply strictly with the instructions and proceed with care.

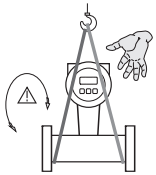
☝ Caution!
"Caution" indicates an action or procedure which, if not performed correctly, can result in incorrect operation or destruction of the device. Comply strictly with the instructions.

✎ Note!
"Note" indicates an action or procedure which, if not performed correctly, can have an indirect effect on operation or trigger an unexpected response on the part of the device.

2 Installation

2.1 Transporting to the measuring point

The covers or caps fitted to the process connections prevent mechanical damage to the sensors during transportation and storage. For this reason, do not remove the covers or caps until immediately before installation.



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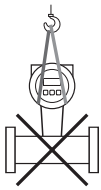
To transport the unit, use slings slung around the process connections or use lugs (if available).

⚠ Warning!
Risk of injury! The device can slip.
The center of gravity of the measuring device may be higher than the holding points of the slings. Always ensure that the device cannot slip or turn around its axis.



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Do not lift measuring devices by the transmitter housing or the connection housing in the case of the remote version. Do not use chains as they could damage the housing.

2.2 Installation conditions

- The maximum permitted ambient temperatures and fluid temperatures must be observed.
- The piping needs to be properly aligned to prevent unnecessary stress to the measuring device.

2.2.1 Dimensions

For the dimensions of the measuring device, see the associated Technical Information on the CD-ROM.

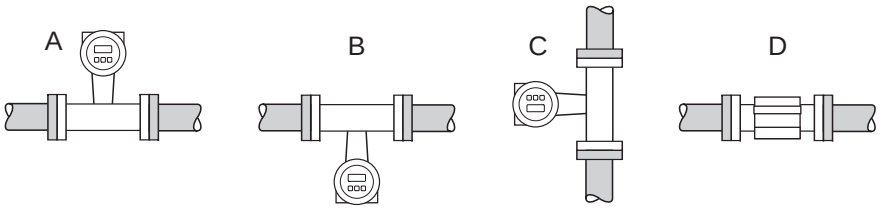
2.2.2 Mounting location

The following mounting locations are recommended:
- Upstream from assemblies such as valves, T-pieces, elbows etc.
- On the pressure side of a pump (for high system pressure)
- At the lowest point in a vertical piping (for high system pressure)

Avoid the following mounting locations:
- The highest point of a piping system (risk of air accumulating).
- Free falling discharge of a piping system.
  Possible ways to use the measuring device in vertical discharging piping → associated Operating Instructions on the CD-ROM.

2.2.3 Orientation

- The direction of the arrow on the nameplate of the measuring device must match the flow direction of the fluid.
- The following graphic illustrates the possible orientations of the measuring device.
  – Orientations A, B and C are recommended.
  – Orientation D is only recommended to a limited extent.



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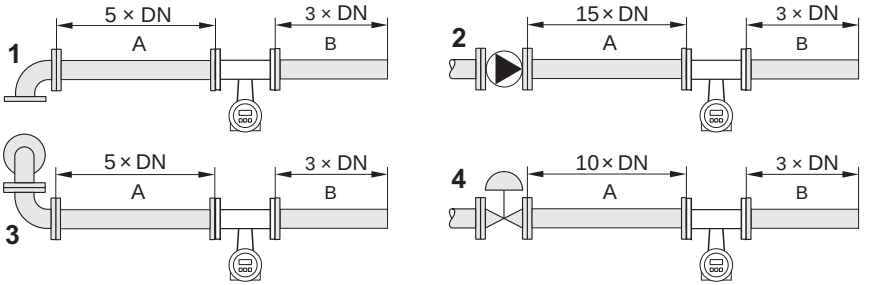
2.2.4 Inlet and outlet runs

If possible, install the sensor well clear of fittings such as valves, T-pieces, elbows, etc. As a minimum, the inlet and outlet runs shown below must be observed to achieve the specified accuracy of the device. The longest inlet run shown must be observed if two or more flow disturbances are present.

A = Inlet run
B = Outlet run
1 = 90° elbow or T-section
2 = Pump
3 = 2 x 90° elbow, three-dimensional
4 = Control valve



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2.2.5 Vibrations

No measures are required.

2.2.6 Heating

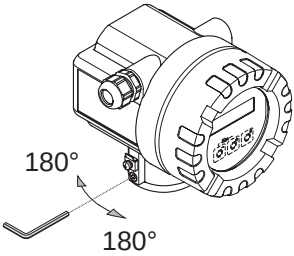
For information on heating → see the associated Operating Instructions on the CD-ROM.

2.2.7 Thermal insulation

For information on thermal insulation → see the associated Operating Instructions on the CD-ROM.

2.3 Installation instructions

2.3.1 Turning the transmitter housing



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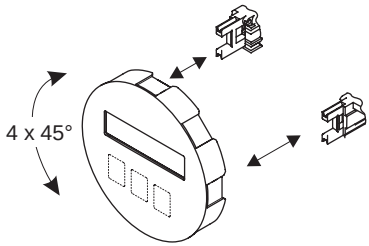
1. Release the lock screw.
2. Turn the transmitter housing to the desired position max. 180° in each direction to the stop.

   Note!
   There are recesses in the rotating groove at 90° stages (only compact version). This helps to align the transmitter more easily.
3. Tighten the lock screw.

2.3.2 Turning the onsite display



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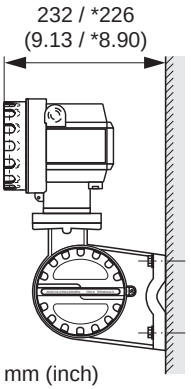
1. Unscrew cover of the electronics compartment from the transmitter housing.
2. Remove the display module from the transmitter retaining rails.
3. Turn the display to the desired position (max. 4 x 45° in each direction) and reset it onto the retaining rails.
4. Screw the cover of the electronics compartment firmly back onto the transmitter housing.

2.3.3 Mounting the remote version

The transmitter can be mounted directly on a wall or pipe.

Mounted directly on the wall



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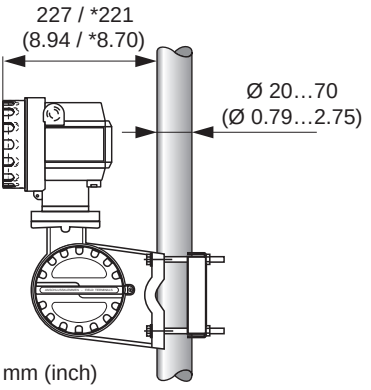
Caution!
- The ambient temperature range may not be exceeded at the mounting location.
- Avoid direct sunlight.

* Dimensions for version without local display

Pipe mounting



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Caution!
- The ambient temperature range may not be exceeded at the mounting location.
- Avoid direct sunlight.
- If the device is mounted to a warm pipe, make sure that the housing temperature does not exceed the maximum permissible value:

* Dimensions for version without local display

2.4 Post-installation check

- Is the measuring device damaged (visual inspection)?
- Does the measuring device correspond to the specifications at the measuring point?
- Are the device markings and tagging correct for the installation site (visual inspection)?
- Sensor orientation correctly selected in terms, fluid properties and fluid temperature?
- Does the arrow on the sensor point in the direction of flow?
- Is the measuring device protected against moisture and direct sunlight?
- Is the measuring device protected against overheating?

3 Wiring

⚠ Warning!
Risk of electric shock! Components carry dangerous voltages.
- Never mount or wire the measuring device while it is connected to the power supply.
- Route the power supply and signal cables so they are securely fixed.
- Fasten the cable entries and covers tight.

☝ Caution!
Risk of damaging the electronic components!
- Connect the power supply in accordance with the connection data on the nameplate.
- Connect the signal cable in accordance with the connection data in the Operating Instructions or the Ex documentation on the CD-ROM.

In addition, for the remote version:

⚠ Warning!
Connect the sensor and transmitter to the same electronical potential.

☝ Caution!
Risk of damaging the electronic components!
- Only connect sensors and transmitters with the same serial number.
- Observe the cable specifications of the connecting cable → Operating Instructions on the CD-ROM.

✎ Note!
Install the connecting cable securely to prevent movement.

In addition, for measuring devices with fieldbus communication:

☝ Caution!
Risk of damaging the electronic components!
- Observe the cable specification of the fieldbus cable → Operating Instructions on the CD-ROM.
- Keep the stripped and twisted lengths of cable shield as short as possible.
- Screen and ground the signal lines → Operating Instructions on the CD-ROM.
- When using in systems without potential equalization → Operating Instructions on the CD-ROM.

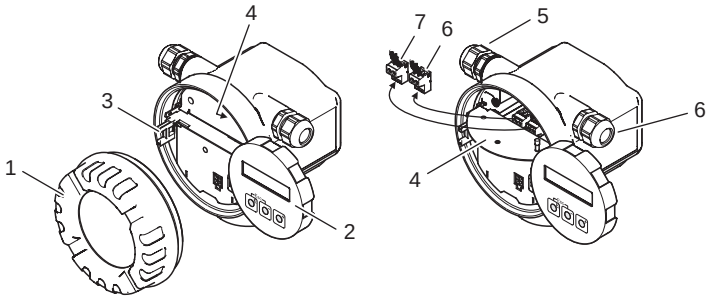
In addition, for Ex-certified measuring devices:

⚠ Warning!
When wiring Ex-certified measuring devices, all the safety instructions, wiring diagrams, technical information etc. of the related Ex documentation must be observed → Ex documentation on the CD-ROM.

3.1 Connecting the various housing types

Wire the unit using the terminal assignment diagram inside the cover.

3.1.1 Compact version, Ex i / non-Ex



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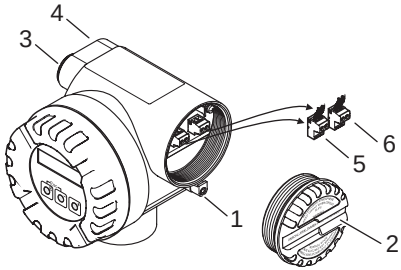
1 Electronics compartment cover
2 Display module
3 Retaining rail for display module
4 Connection compartment cover (connection diagram)
5 Cable gland for power supply/current output cable
6 Cable gland for pulse output/frequency output cable (optional)
7 Terminal connector for power supply/current output cable
8 Terminal connector for pulse output/frequency output cable (optional)

3.1.2 Compact version, Ex d



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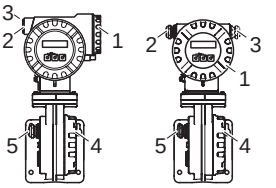
1 Securing clamp for connection compartment cover
2 Connection compartment cover (connection diagram)
3 Cable gland for power supply/current output cable
4 Cable gland for pulse output/frequency output cable (optional)
5 Terminal connector for power supply/current output cable
6 Terminal connector for pulse output/frequency output cable (optional)

3.1.3 Remote version (transmitter), Ex i and Ex d



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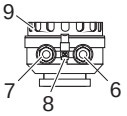
Transmitter connection:

1 Connection diagram inside the connection compartment cover
2 Connecting cable for power supply/current output
3 Connecting cable for pulse/frequency output (optional)

Connecting cable connection:

4 Connection diagram inside the connection compartment cover
5 Sensor/transmitter connecting cable

3.1.4 Remote version (sensor)



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Connecting cable connection:

Connecting the connecting cable:
6 Signal cable
7 Dummy plug
8 Ground terminal for potential equalization

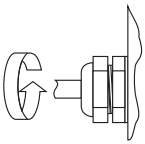
Transmitter connection:
9 Connection compartment cover (connection diagram on the inside)

3.2 Degree of protection

The devices meet all the requirements for IP 67.

After mounting in the field or service work, the following points have to be observed to ensure that IP 67 protection is retained:

- Install the measuring device in such a way that the cable entries do not point upwards.
- Do not remove the seal from the cable entry.
- Remove all unused cable entries and plug them with suitable dummy plugs.



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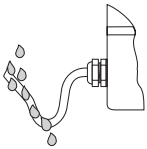
Tighten the cable entries correctly.



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The cables must loop down before they enter the cable entries ("water trap").

3.3 Post-connection check

- Are cables or the device damaged (visual inspection)?
- Does the supply voltage match the information on the nameplate?
- Do the cables used comply with the necessary specifications?
- Do the mounted cables have adequate strain relief and are they routed securely?
- Is the cable route completely isolated? Without loops and crossovers?
- Are all screw terminals firmly tightened?
- Are all cable entries installed, firmly tightened and correctly sealed?
- Are cables looped downward (water trap)?
- Are all the housing covers installed and securely tightened?

In addition, for measuring devices with fieldbus communication:

- Are all the connecting components (T-boxes, junction boxes, connectors, etc.) connected with each other correctly?
- Has each fieldbus segment been terminated at both ends with a bus terminator?
- Has the max. length of the fieldbus cable been observed in accordance with the specifications?
- Has the max. length of the spurs been observed in accordance with the specifications?
- Is the fieldbus cable fully shielded and correctly grounded?

4 Hardware settings

This section only deals with the hardware settings needed for commissioning. All other settings (e.g. output configuration, write protection, etc.) are described in the associated Operating Instructions on the CD-ROM.

Note!
No hardware settings are needed for measuring devices with HART-type communication.

Warning!
Risk of electric shock! Risk of damaging the electronic components!
- All the safety instructions for the measuring device must be observed and all the warnings heeded → Page 12.
- Use a workspace, working environment and tools purposely designed for electrostatically sensitive devices.

4.1 Write protection

Write protection can be activated and deactivated on measuring devices with PROFIBUS PA and FOUNDATION Fieldbus-type communication.

Write protection is activated and deactivated with a DIP switch → Page 17 (graphic, D).

4.2 Device address

The device address must be configured for devices with PROFIBUS PA-type communication.
The device address can be configured via:
- Hardware addressing via DIP switch
- Software addressing → see Operating Instructions on CD-ROM

4.2.1 Hardware addressing via DIP switch

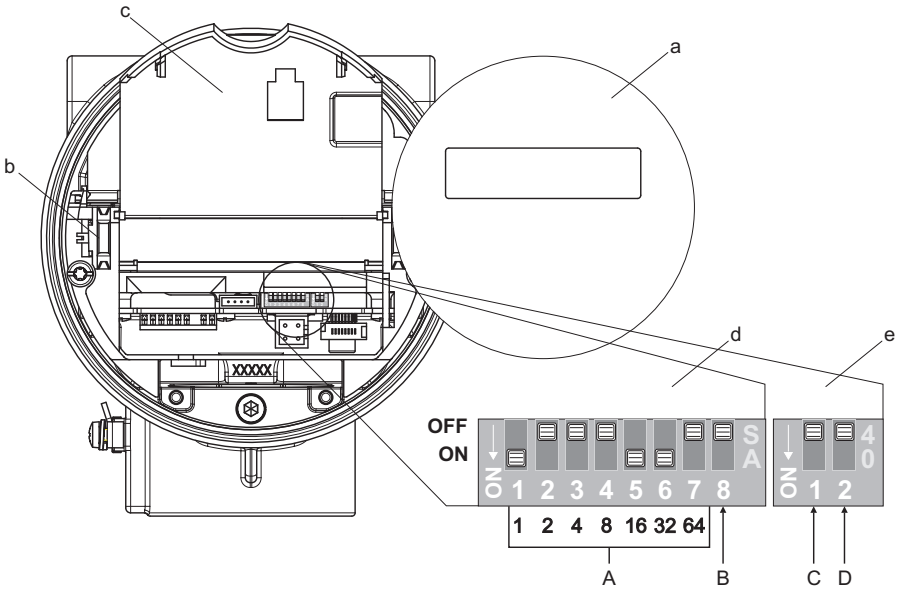
1. Setting the type of addressing via DIP switch → Page 17 (graphic, C)
2. Setting the device address via DIP switches → Page 17 (graphic, A)

4.3 Simulation

The simulation mode can be activated and deactivated on measuring devices with FOUNDATION Fieldbus-type communication.

The simulation mode is activated and deactivated with a DIP switch → Page 17 (graphic, C).

4.4 Overview of DIP switches



a = Display module
b = Retaining rails of local display module
c = Plastic covers

d = DIP switches, block 1

A = Configuring the device address

Example:
Configuring the device address 49

- DIP switch 1 = ON = 1
- DIP switches 2 to 4 = OFF = 0
- DIP switch 5 = ON = 16
- DIP switch 6 = ON = 32
- DIP switch 7 = OFF = 0

Device address: 1 + 16 + 32 = 49

B = Not assigned

e = DIP switches, block 2

C = Depends on the type of communication:
- Profibus PA → type of addressing:
  - OFF = SW addressing via operating program (factory setting)
  - ON = HW addressing via DIP switch
- FOUNDATION Fieldbus → simulation mode
  - OFF = Simulation mode disabled (factory setting)
  - ON = Simulation mode enabled

D = Write protection
- OFF = Write protection disabled: write access possible (factory setting)
- ON = Write protection enabled: write access not possible

5 Commissioning

5.1 Switching on the measuring device

On completion of the installation (successful post-installation check), wiring (successful post-connection check) and after making the necessary hardware settings, where applicable, the permitted power supply (see nameplate) can be switched on for the measuring device.

Once the power supply has been switched on, the measuring device performs a number of internal test functions and the following message appears on the display:

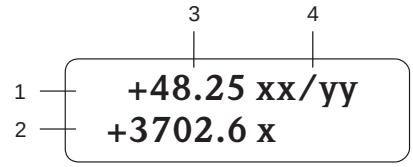
PROSONIC FLOW 92 **V XX.XX.XX**	Displays the current software

The measuring device starts operating as soon as the startup procedure is complete.
Various measured values and/or status variables appear on the display.

✎ Note!
If an error occurs during startup, this is indicated by an error message.
The error messages that occur most frequently when a measuring device is commissioned are described in the Troubleshooting section → Page 23.

5.2 Operation

5.2.1 Display elements



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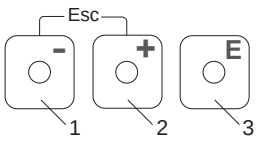
Display lines/fields

1. Main line for primary measured values
2. Additional line for additional measured variables/status variables
3. Current measured values
4. Engineering units/time units

5.2.2 Operating elements



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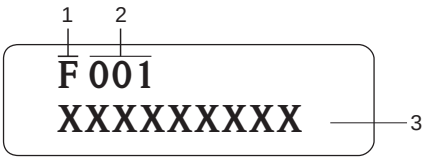
Operating keys

1. (–) Minus key for entering, selecting
2. (+) Plus key for entering, selecting
3. Enter key for calling the function matrix, saving

When the +/– keys are pressed simultaneously (Esc):
- Exit the function matrix step-by-step:
- > 3 sec. = cancel data input and return to the measured value display

5.2.3 Displaying error messages



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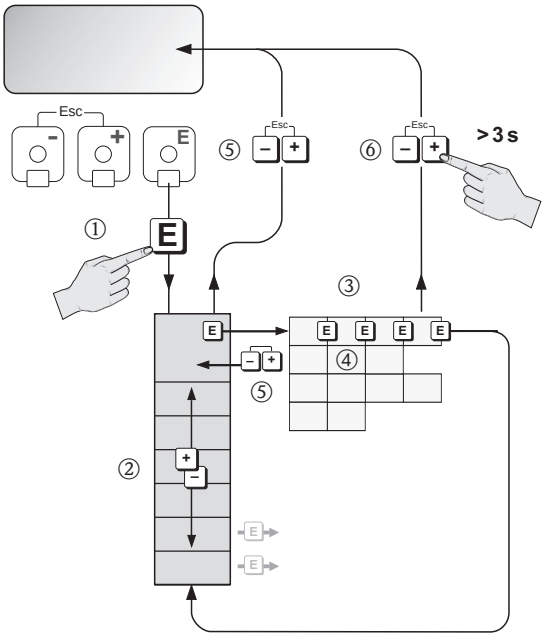
1. Type of error:
   F = Failure
   M = Maintenance needed
   C = Function check
   S = Outside specification
2. Error number
3. Diagnosis message

Note!
- The display alternates between the error number and diagnosis message and the last measured value.
- List of all error messages, see associated Operating Instructions on the CD-ROM

5.3 Navigating within the function matrix



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1. E → Enter the function matrix (starting with measured value display)
2. ± → Select group/function group (e.g. CURRENT OUTPUT)
   E → Confirm selection
3. ± → Select function (e.g. LANGUAGE)
4. ± → Enter code **92** (only for the first time you access the function matrix)
   E → Confirm entry

   ± → Change function/selection (e.g. ENGLISH)
   E → Confirm selection
5. ± → Return to measured value display step by step
6. ± > 3 s → Return immediately to measured value display

5.4 HART commissioning – Commissioning Quick Setup

All the functions needed for commissioning are called up automatically with the Quick Setup. The functions can be changed and adapted to the process in question.

1. E → Enter the function matrix (starting with measured value display)
2. ± → Select the group QUICK SETUP
   E → Confirm selection
3. QUICK SETUP COMMISSIONING function appears.
4. Intermediate step if configuration is blocked:
   ± → Enter the code **92** (confirm with E) and thus enable configuration
5. ± → Go to Commissioning Quick Setup
6. ± → Select YES
   E → Confirm selection
7. E → Start Commissioning Quick Setup
8. Configure the individual functions/settings:
   – Via ±-key, select option or enter number
   – Via E-key, confirm entry and go to next function
   – Via -key, return to Setup Commissioning function
   (settings already made are retained)

✎ Note!
Observe the following when performing the Quick Setup:
- Output selection: This is not offered again for selection after configuring an output
- Automatic configuration of the display: Select YES
  – Line 1 = Volume flow
  – Line 2 = Totalizer 1

All the available functions of the measuring device and their configuration options as well as additional Quick Setups, if available, are described in detail in the "Description of Device Functions" manual. The related Operating Instructions can be found on the CD-ROM.

The measuring device is ready for operation on completion of the Quick Setup.

5.5 PROFIBUS PA commissioning

Measuring devices with PROFIBUS PA communication are configured and commissioned via an operating program such as FieldCare.
Detailed information on commissioning is provided in the corresponding Operating Instructions on the CD-ROM.

5.6 FOUNDATION Fieldbus commissioning

Measuring devices with FOUNDATION Fieldbus communication are configured and commissioned via an operating program such as FieldCare.
Detailed information on commissioning is provided in the corresponding Operating Instructions on the CD-ROM.

5.7 Troubleshooting

A description of all the error messages is provided in the Operating Instructions on the CD-ROM.

✎ Note!
The output signals (e.g. pulse, frequency) of the measuring device must correspond to the higher order controller.

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